



Casualty Investigations

Gambling with Safety

Allision of a towing vessel.

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Gambling is always a risky venture, but that's usually part of its appeal. On the evening of April 4, 1998, however, the gamblers aboard the *Admiral's* President Casino in St. Louis, Mo., unwillingly encountered a game of chance with their lives. While more than 2,000 people were enjoying the casino's entertainments, just a short distance away, the M/V *Anne Holly* allided with a bridge, which set adrift most of its 14 barges. The strong current carried some of those barges back toward the casino, a permanently moored vessel, ultimately parting nine of its 10 mooring lines and swinging it out into the river. The gambling inside the casino suddenly took a dramatic turn outside.

The potential for a major maritime casualty loomed large, but thanks to a number of quick-thinking people and a lot of luck, nobody aboard either vessel was seriously hurt and the damaged barges were quickly recovered. But what makes this accident so noteworthy—besides its brush with catastrophe—is how it set the stage for a number of valuable maritime safety improvements.

Incident Overview

To understand the value of the safety improvements requires first examining the accident in greater detail.

Waterway/Transit Hazards

In some ways the accident almost seemed inevitable, as

the waterway on which it took place is well known for its difficulties. With four bridges (Poplar, MacArthur, Eads, and Martin Luther King) located within a narrow 1.2 mile navigable channel, St. Louis Harbor on the Upper Mississippi River requires an experienced pilot. Specifically the Eads Bridge—where the allision began—has long been recognized as one of the most difficult navigation areas on the Western Rivers. Clearing the bridge's diminishing vertical clearance requires steady steering and concentrated accuracy.

In addition to the four bridges that are always of concern to pilots, the water itself presented an unusual challenge the night of the allision. High river conditions had been noted at the St. Louis River level gage for several days. On the evening of April 4, the river

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current was running about six mph at a river gage of approximately 31.5 feet; in St. Louis the flood stage is 30.0 feet. This high river gage significantly increased the hazards to all vessels navigating through St. Louis Harbor, prompting the Coast Guard to issue a safety zone that included a “daylight operation only” restriction on southbound tows over 600 feet. As the *Anne Holly* was traveling northbound, it was not affected by the safety zone and thus the transit occurred during the more challenging night hours.

The Allision

The captain was a very skilled pilot with more than 38 years of maritime experience. Shortly after 5 p.m. on April 4, he relieved the pilot on watch, watched over the completion of the tow’s barge configuration, and confirmed with the engine room that all propulsion and engine room equipment was operating satisfactorily. Both the tow and its crew were prepared for the transit. About 6:30 p.m., the vessel got underway from the fleeting area, heading upstream, pushing 12 loaded and two empty barges secured to each other with extra rigging because of the severe river conditions. The complete tow, including the 154-foot-long towboat, was 1,149 feet long and 105 feet wide.

Shortly after getting underway, however, the captain requested towing vessel assistance through the four bridges to ensure safe transit. Unfortunately there was only one vessel working at the time and its operator replied that he was unable to meet the request. According to testimony included in the Coast Guard

Investigation Report afterward, the captain responded that he “seemed to be moving OK and would keep going” without an assist vessel. This ended up being a mistake.

The *Anne Holly* successfully passed under both the MacArthur and Poplar Street Bridges, and began the tricky approach to the Eads Bridge. The only passage possible under the bridge, with the tow’s height and the increased flood stage, was directly under the center span. This approach required a course change and repositioning of the tow alignment. It is this steering maneuver that caused the allision and its domino effect.

As the forward barges passed under the bridge’s center span, the captain began steering to port to ensure the pilot house would pass under the center span and to properly align the tow for passage under the next bridge. Partway under the bridge the vessel stalled, its forward movement essentially halted by the opposing river current. With the headway stopped, the current caused the tow to drift sideways toward the Missouri shore, pushing the tow’s port side barges into a bridge support and breaking its tow coupling. A number of the barges broke away from the tow and started drifting back south. With only a few barges still attached to the tow, the captain quickly radioed for assistance and attempted to hail the nearby *Admiral*.

Just north of the St. Louis Gateway Arch on the Mississippi River, the 380-foot-long *Admiral* is a permanently moored vessel that plays host to hundreds of thousands of people each year. That particular evening more than 2,000 staff and guests were wrapped up in the clinking of coins, the whirring of slot machines, and the excited shouts of winners. With the *Anne Holly*’s attempt at contacting the *Admiral* unsuccessful, everyone on the vessel remained temporarily oblivious to the disaster unfolding so closely.

Shortly thereafter though, one or more barges allided with the *Admiral*’s bow and another struck an entrance ramp, breaking the walkway loose from its moorings. Several people on the ramp were quickly evacuated off, all of them successfully reaching the Missouri bank seconds before the ramp sank. With eight of its 10 mooring lines now parted, the *Admiral* began to rotate clockwise downriver away from the Missouri bank.

Watching the casino vessel swing out into the river was the captain of a towing vessel and the master on watch of a nearby gaming vessel. Both men quickly



broadcast urgent messages to the *Anne Holly*, informing it of the path of lost barges. Upon hearing the messages, the captain quickly released the remaining barges, turned the tow around, and raced downriver placing the bow against the *Admiral* as its next-to-last mooring line parted. The vessel actually transited about 500 feet downriver, but the combined efforts of the *Anne Holly* and the last remaining mooring wire successfully held the vessel near the Missouri bank.

The *Admiral* had evaded disaster. But with the entrance now facing the river, the passengers had to cross from the *Admiral* to the *Anne Holly*, where they were then transferred to two excursion vessels and subsequently to shore. There were a number of reported injuries from passengers, but fortunately none of them were considered serious. The casino vessel itself retained significant damage to the bow and all three entrance ramp walkways were separated; its initial estimated cost was over \$10 million. Thirteen of the *Anne Holly*'s barges were recovered within an hour of the incident, while one barge sank; the initial estimate of structural damage to the barges was over \$400,000. Fortunately there was no structural damage to the Eads Bridge.

Cause

The Coast Guard and National Transportation Safety Board (NTSB) Investigation Reports, while conducted independently, both attributed the cause of the allision and subsequent breakup of the tow to poor decision-making on the part of the *Anne Holly*'s captain. They both specifically cited his failure to properly account for the prevailing currents, which led him to oversteer. According to the findings of the Coast Guard Report, "as the lead barges in the unit responded to the steering maneuver, the main downriver current acted with the increasing intensity on the unit's starboard side. Meanwhile, the cross current at the Eads Bridge, flowing in a direction opposite to that expected by [the captain], intensified the

rate of turn beyond that anticipated." The high river conditions and subsequent limited vertical clearance under the Eads Bridge during a nighttime transit were also listed as potential contributing factors.

The captain acknowledged in his testimony to the NTSB that nighttime transits in the St. Louis Harbor are definitely more difficult than daytime transits. During the NTSB investigation, he commented that "The biggest difference in daytime you can see your current, you can see your setting. At nighttime the only thing you have to rely on is your radar and your searchlight. Which the radar doesn't pick up current. It doesn't pick it up, and your searchlight you can't see it... But on the Eads Bridge in particular you have no way of, you know, other than common knowledge, of what the current is going to do."

To the captain's credit, testimony included in the Coast Guard Report stated that no evidence was found to suggest that alcohol or drugs contributed to the accident, and there was "no actionable misconduct, inattention to duty or willful violation of the law." The report also acknowledged that the captain properly considered the navigation markers in determining the vessel's position for passage under the bridges and that his actions after the casualty "were commendable, and likely played a large role in minimizing injury or loss of life and further damage to property." Regardless of his efforts both before and after the allision, there was still enough evidence to charge him with negligence under Title 46 of the US Code of Federal Regulations Part 5. The captain pleaded no contest in September 1998 and all valid licenses and documents issued to him by the Coast Guard were suspended for two months, remitted on six months probation.

Could the Accident Have Been Prevented?

Ironically, this accident was not the first time the *Admiral* had been struck. In 1994, shortly after the



1 The *Anne Holly* crosses under both the MacArthur and Poplar Street Bridges.



2 The vessel approaches the Eads Bridge.

allision of the M/V *Robert Y. Love* with the *Admiral*, the Coast Guard Captain of the Port (COTP) at Marine Safety Office St. Louis wrote a letter to the Corps of Engineers St. Louis District, requesting “a review of the *Admiral*’s permit, to determine if additional conditions are necessary to assure public safety.” When the Corps of Engineers updated the permit, personnel informed the owner that engineers had “deemed it necessary that the *Admiral* must emplace a protection cell to provide protection from ice flow, debris, and breakaway tows.” Accordingly, a professional engineering consulting firm was hired to perform a risk assessment in 1995. The resulting assessment noted that although breakaway upriver tows had struck the vessel three times in the same mooring position, a protection cell might actually redirect barges toward the vessel. The Coast Guard COTP later agreed that a protection cell “would not significantly improve the public’s safety. This conclusion is particularly valid given the probability of a change in the vessel’s location in the near future.”

Unfortunately the casino’s location did not change prior to the April 1998 accident, nor were protection cells added. Validly arguable on both sides, whether or not such cells would have made a difference with the *Anne Holly* remains unknown. Since the allision though, the *Admiral* has been moved 1,000 feet and now resides—buffered by protection cells—just north of the last of St. Louis Harbor’s four bridges.

Actions Taken

The many questions of “What if...” undoubtedly made the *Anne Holly* / *Admiral* allision a noteworthy accident. What if the allision had been more severe? What if the drifting barges had been heavier or larger? What if the *Admiral* had parted its last remaining mooring line and been forced southbound toward the Poplar Street Bridge, which did not have the vertical clearance for the *Admiral*? The questions are daunting. With more than 2,000 people on board, the consequences of a subsequent sinking could have been cata-

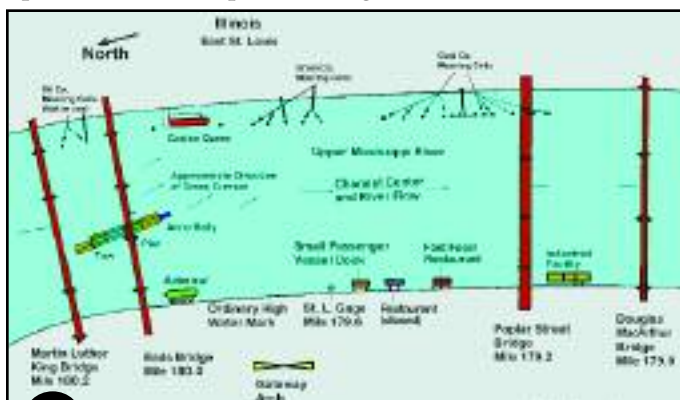
strophic. Those questions—and the fear of their answers—served as the impetus for a number of safety improvements for permanently moored vessels.

Permanently Moored Vessel Quality Action Team

As with all Coast Guard casualty investigations, the objective of this investigation was to determine the cause of the accident and support recommendations to improve safety and help eliminate future similar accidents. To more thoroughly review the investigation’s recommendations, and because of a number of other recent accidents involving permanently moored vessels, the Coast Guard convened a Quality Action Team (QAT). The goals of the team were to identify risks involving permanently moored vessels, establish more formal means of Coast Guard involvement in their siting and mooring, and develop measures for reducing their risk of accidents. The QAT’s report was issued in December 1999 and addressed many of the recommendations from the *Anne Holly* investigation.

The QAT found that barge breakaways, collisions, and high water were the main causes of permanently moored vessels parting their moorings. The team also found that 68 percent of the accidents occurred at high-risk locations. The QAT report concluded that site selection was the most effective way of managing permanently moored vessel risk. Where site selection options were limited, the next option suggested in the report was site modifications such as the installation of protection cells (like the ones discussed with the *Admiral*).

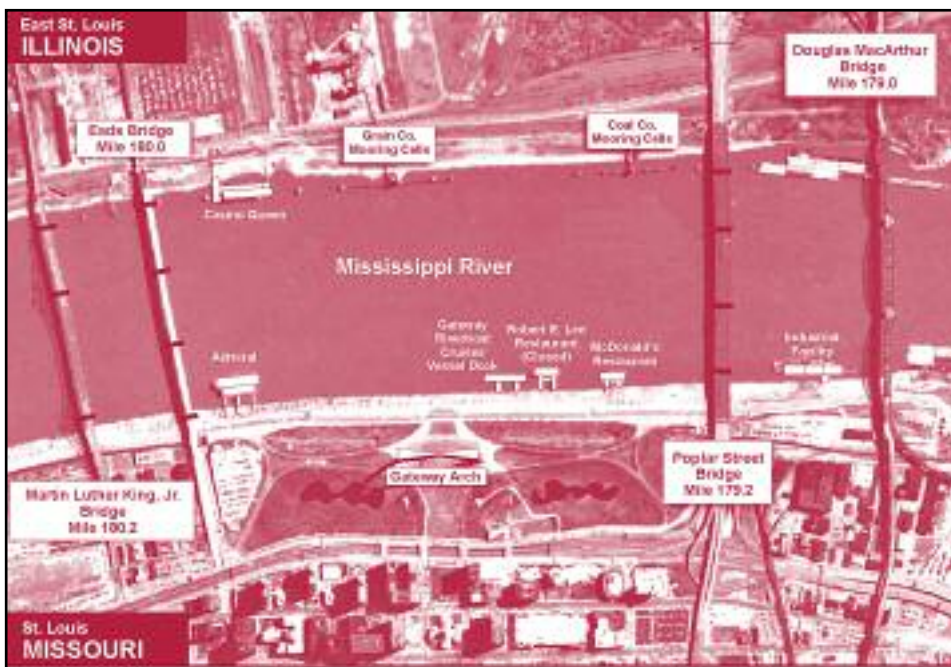
The members of the QAT also developed a Permanently Moored Passenger Vessel Initial Risk Assessment for Coast Guard field units to better quantify risks. The methodology that created the assessment relied on expert opinion, experience, and local knowledge from Coast Guard field units. To confirm the assessment’s validity, the QAT examined accident data from almost 300 accidents (including



3 The only passage possible under the bridge with the increased flood stage is directly under the center span.



4 Partway under the bridge the vessel stalls, and the current causes the tow to drift sideways, pushing barges into a bridge support and breaking the tow coupling.



This area has long been recognized as one of the most difficult navigation areas on the Western Rivers.

groundings, collisions, allisions, and breakaways) that occurred between 1992 and 1997 within one-half mile upstream of permanently moored vessels. That accident data generally validated the methodology, and those accident statistics were used to establish acceptable risk scores.

The information and recommendations listed within the QAT were then used as the base for changes in Coast Guard policies applicable to permanently moored vessels. These policy changes, including the Risk Assessment, were included in the 2000 update of the Coast Guard's *Marine Safety Manual* (MSM).

Update of the *Marine Safety Manual*

Volume II, Section B, Chapter 4 of the Coast Guard's *Marine Safety Manual* addresses permanently moored vessels. It is here that a large number of the recommendations from both the *Anne Holly* investigation

and the QAT have been fully addressed. As mentioned above, the Permanently Moored Passenger Vessel Initial Risk Assessment is included. The assessment's six categories—location, traffic, response, anticipated environmental factors, severe and sudden environmental factors, and passenger exposure—all help determine the safety of the vessel.

According to the MSM, the risk assessment is to be conducted prior to a vessel being placed in permanently moored vessel status. Essentially, the initial assessment is designed to determine whether a vessel appears safe or warrants a formal risk assessment. The six categories can each receive a risk score (or value) from one to five, with one being poor and five being outstanding. If the total score is 13 or less, the COTP then involves the vessel

owner/operator and they review the areas of high risk and attempt to lower them. This review is followed by another scoring and if the score remains 13 or less, the COTP should require the owner/operator to present a formal risk assessment. Because the QAT showed that a vessel's site location is most important in managing risk, this same review holds true if the location category alone receives a score of two or less.

Another of the recommendations from both the *Anne Holly* investigation and the QAT was the need for clarification of the term "vessel" to assist Coast Guard COTP responsibilities shared by overlapping regulatory jurisdictions. Obliging, the MSM now notes that "a vessel taken out of transportation and permanently moored falls somewhere between a statutory definition of a vessel and a building or land structure and is deemed to be 'substantially a land structure.'" The MSM continues with the listing of



5 A number of the barges break away and drift back south.



6 One or more barges allide with the *Admiral's* bow and strike an entrance ramp, breaking the walkway loose from its moorings.

criteria needed for determining how a vessel meets “substantially a land structure” status.

To receive a permit for a permanently moored vessel, requests are submitted, not to the Coast Guard, but to the Army Corps of Engineers. The reason is outlined in Section 10 of the River and Harbor Act of 1899, which states that it is the Corps of Engineers who is deemed responsible for issuing permits for structures on navigable waterways. And according to the Coast Guard’s MSM, “a floating fuel dock ... restaurant, museum, etc., is not a ‘vessel’ for inspection purposes if it is permanently moored and thus taken out of navigation.” As the Coast Guard is responsible for ensuring maritime safety of people and vessels—both on and near the water—this shared responsibility between the two groups can be confusing. This confusion over authority and responsibility was listed under many areas of recommendation in both the *Anne Holly* investigation and the QAT.

Coast Guard/Corps of Engineers Memorandum of Agreement

Because a vessel switches from the Coast Guard’s authority to the Corps of Engineers when it receives permanently moored vessel status, one of the concerns voiced during the investigation was the feeling that the Coast Guard should be more involved and seek a formal role in guaranteeing safety on “substantial land structures.” While the responsibility for issuing permits remains with the Corps of Engineers, a Memorandum of Agreement (MOA) between the Coast Guard and Corps of Engineers was signed in June 2000 establishing a formal process “through which the Coast Guard provides input during the evaluation process for issuing permits, including permanently moored vessels and facilities on safety standards, emergency equipment, and other safety conditions.”

To facilitate this transition and help guarantee that a

vessel is ready to change status, COTPs evaluate each vessel’s mooring arrangements beforehand. Once they have determined that the vessel meets the risk criteria, the Corps of Engineers provides a site permit and the Coast Guard then transfers responsibility for future safety regulation of the vessel to local authorities. As mentioned in both the MSM and the MOA, the Coast Guard continues to remain involved with the permanently moored vessel, reevaluating the vessel’s risks every two years (and when pertinent local conditions change), using the aforementioned risk assessment.

Conclusion

The allision of the *Anne Holly* with the Eads Bridge and the subsequent ramming of its barges into the *Admiral* was an unfortunate accident that fortunately yielded valuable maritime safety improvements. The creation of the risk assessment, along with clarification of permanently moored vessels and the Coast Guard’s role with them, has created a more quantified means of assessing risk and establishing safer measures. This results in higher levels of safety for all.

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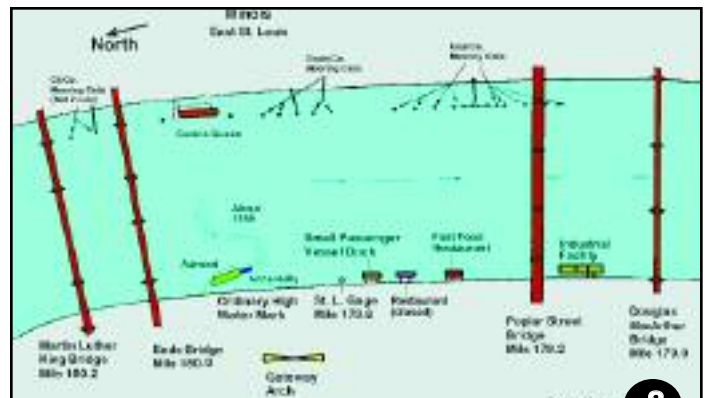
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The captain releases the remaining barges, turns the towboat around, and places the bow against the *Admiral* as the casino’s next-to-last mooring line parts. Photos courtesy NTSB.



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